National Aeronautics and
Space Administration

NASA EARTH SYSTEM SCIENCE FELLOWSHIP PROGRAM

(Formerly the Global Change Research Fellowship Program and the Earth Science Graduate Student Research Program)

Proposals as New Applications Due March 15, 2002
Proposals as Renewal (2nd-/3rd-year) Applications Due May 31, 2002

NASA Graduate Student Fellowships
In Earth System Science

Introduction

NASA announces graduate student fellowships for persons pursuing Master of Science (M.Sc.) or Doctoral (Ph.D.) degrees in Earth System Science. The purpose of NASA's Earth System Science (ESS) Fellowship Program is to ensure continued training of interdisciplinary scientists to support the study of the Earth as a system; particular emphasis is placed on the applicant's ability and interest in pursuing academic training and research using Earth remote sensing. Over 500 Ph.D. and M.Sc. fellowships have been awarded since the inception of the program in 1990.

The financial support for the ESS Fellowships comes from both the Earth science portion of NASA's Graduate Student Researchers Program (GSRP) provided by the NASA Education Division (http://education.nasa.gov/), and the Office of Earth Science (http://www.earth.nasa.gov/). For the 2001/2002 academic year, NASA will award up to 50 new fellowships.

Scientific Areas of Support

Using the unique vantage points from space, aircraft, and in situ platforms, NASA's Earth Science Enterprise (ESE) is dedicated to developing a scientific understanding of the Earth system and its response to natural and human-induced changes to enable improved prediction of climate, weather, and natural hazards for present and future generations. The overarching question that strategically guides ESE research and development is:

How is the Earth changing and what are the consequences for life on Earth?

The key ESE research topics fall largely into three categories: forcings, responses, and the processes that link the two and provide feedback mechanisms. Specifically,

- How is the global Earth system changing?
  - Is the global cycle of water through the atmosphere accelerating?
  - How is the global ocean circulation varying on climatic time scales?
  - How are global ecosystems changing?
  - How is stratospheric ozone changing, as the abundance of ozone-depleting chemicals decreases?
  - Are polar ice sheets losing mass as a result of climate change?
  - What are the motions of the Earth and the Earth's interior, and what information can be inferred about Earth's internal processes?

- What are the primary forcings of the Earth system?
  - What trends in atmospheric constituents and solar radiation are driving global climate?
  - What are the changes in global land cover and land use, and what are their causes?
  - How is the Earth's surface being transformed and how can such information be used to predict future changes?

- How does the Earth system respond to natural and human-induced changes?
  - What are the effects of clouds and surface hydrologic processes on climate change?
  - How do ecosystems respond to environmental change and affect the global carbon cycle?
  - Will climate variations induce major changes in the deep ocean?
  - How do stratospheric trace constituents respond to climate change and chemical agents?
  - Will changes in polar ice sheets cause a major change in global sea level?
  - What are the effects of regional pollution on the global atmosphere, and the effects of global chemical and climate changes on regional air quality?

- What are the consequences of change in the Earth system for human civilization?

- How are variations in local weather, precipitation and water resources related to global climate change?
- What are the consequences of land cover and land use change?
- To what extent are changes in coastal regions related to climate change and sea-level rise?

- How well can we predict the changes to the Earth system that will take place in the future?
  - To what extent can weather forecasting be improved by new global observations and advances in satellite date assimilation?
  - To what extent can transient climate variations be understood and predicted?
  - To what extent can long-term climate trends be assessed and predicted?
  - To what extent can future atmospheric chemical impacts be assessed?
  - To what extent can future atmospheric concentrations of carbon dioxide and methane be predicted?

The twenty-three science questions formulated above indicate the complexity of the global Earth environment, the multiplicity of interactions between component processes, and cross-disciplinary connections among them. In addressing these complex problems, the ESE supports both basic and applied research that builds on the strength of the existing Earth science disciplines – generally focused on individual components of the Earth system, but provide a common language and the background knowledge for articulating focused science questions and suggesting productive research methodologies. The research themes are organized as follows:

- Biology and Biogeochemistry of Ecosystems and the Global Carbon cycle
- Atmospheric Chemistry, Aerosols, and Solar Radiation
- Global Water and Energy Cycle
- Oceans and Ice in the Earth System
- Solid Earth Science

Further details about the research strategy of the Earth Science Enterprise are available at http://www.earth.nasa.gov/visions/researchstrat/Research_Strategy.htm.

Fellowship applications will be considered for research in atmospheric chemistry and physics, ocean biology and physics, ecosystem dynamics, hydrology, cryospheric processes, geology, geophysics, and information science and engineering, provided that the specific research topic is relevant to NASA's Earth remote sensing science, process studies, modeling and analysis in support of the U.S. Global Change Research Program (USGCRP). NASA discourages submission of paleo-climate related applications to this program. Proposals that address the molecular biology, biochemistry, development, physiology, or evolution of living organisms, but do not focus on ecosystems (terrestrial or marine) and their role in the Earth system functioning, should be submitted to NASA's Graduate Student Researchers Program (GSRP; deadline February 1, http://education.nasa.gov/gsrp/), under appropriate elements (e.g., Office of Biological and Physical Resarch, Office of Space Science, etc.) Additional information about the Earth Science Enterprise – its scientific priorities, recent accomplishments, etc. – can be found at **http://www.earth.nasa.gov/** .

Terms and Conditions

Awards are made initially for one year and may be renewed annually, no more than two additional years for a total of three years, based on satisfactory progress as reflected in academic performance and evaluations by the faculty advisor. The three-year period is the maximum length a student may receive NASA support in pursuing M.Sc. and/or Ph.D. degree(s). For example, a student who has been supported for three years to obtain her/his M.Sc. degree cannot apply for additional three years of Ph.D. support. However, for students who are in the second or third year of their M.Sc. program may use the three years of support to complete their M.Sc. degree and to initiate their Ph.D. research. In either case, the maximum period of support is three years. The amount of the award is $24,000/annum, which may be used to defray

student's stipend, living and educational expenses, travel expenses to scientific conferences, tuition, and fees.

Eligibility

Students admitted to or already enrolled in a full-time M.Sc. and/or Ph.D. program at accredited U.S. universities are eligible to apply. Students may enter the program at any time during their graduate work. Students may also apply in their senior year prior to receiving their baccalaureate degree, but must be admitted and enrolled in a M.Sc. and/or Ph.D. program at a U.S. university at the time of the award. An individual accepting this award may not concurrently receive other Federal funds, including funds from other Federal fellowships or traineeships. However, NASA may allow an applicant receiving Fellowship Supplements from other U.S. Federal agencies to cover expenses not covered by NASA's educational fellowships. An example is the purchase of equipment, which is not permitted by NASA Fellowships but is covered by the National Science Foundation Graduate Research Fellowships. United States citizens and resident aliens will be given preference, although the program is not restricted to them. Students with disabilities and from underrepresented minority groups are urged to apply. No applicant shall be denied consideration or appointment as a NASA Earth System Science Fellow on grounds of race, creed, color, national origin, age, or sex.

Obligation to the Government

A student receiving support under the Earth System Science Fellowship program does not thereby incur any formal obligation to the Government of the United States. However, the objectives of this program will clearly be served best if the student actively pursues research or teaching in the field of Earth system science after completion of graduate studies.

Disposition of Unused Funds

In case a student or faculty advisor ceases to participate in the program for any reason, the university with prior NASA approval may appoint another student or faculty advisor to complete the remaining portion of the current grant year provided the area of research remains the same. Beyond the current grant year, the new recipient must submit a complete application to NASA to be evaluated with other new applicants in the next announcement cycle in the following year.

Proposal Evaluation and Selection

The selection of proposals for award will be made by NASA Headquarters on a competitive basis. Criteria for evaluation include: (a) academic excellence as based on applicant's transcripts and a letter of reference by student's academic advisor; (b) the quality of the proposed research; and (c) the relevance of the proposed research to the Earth Science Enterprise and NASA's role in the U.S. Global Change Research Program as outlined above. Evaluation will be conducted by members of the academic community, the Office of Earth Science, and professional societies in Earth remote sensing and scientific disciplines.

Application Procedures

<u>New Applications</u>

All new applicants must submit twenty (20) copies of the proposals, including at least one (1) with original signatures and official copies of the transcript(s). All copies of the proposal should be printed only on one side of each sheet. The type size must be clear and readily legible, in standard font size that is 10 to 12 points; no smaller than 10-point font size will be accepted. Each of the twenty (20) copies of the proposal must be individually stapled by assembling the necessary materials in the following order:

1. A completed application form, including signatures of the applicant, the faculty advisor, and the institutional official

2. A titled abstract (one-half page) and a description of proposed research, totaling no more than 6 single-spaced pages. The research plan should be presented with a clear hypothesis or questions to be addressed by the proposed work.
3. A schedule stating the proposed start date and completion date of your degree
4. A completed budget form.
5. A recommendation letter from the academic advisor
6. Copies of undergraduate and graduate transcripts (Provide explanations if the transcripts are not current or recent.)

Renewal Applications

All renewal applications must include three (3) copies of the following materials, including at least one (1) with original signatures.

1. A completed application form, including signatures of the applicant, the faculty advisor, and the institutional official
2. A progress report of approximately 3-6 pages in length. The progress report should (a) summarize work accomplished during the previous year, relating the actual accomplishments with the plan originally outlined in the proposal and/or including any unanticipated opportunities, surprises or unusual developments, and (b) describe plans for the coming year, including explanations of any substantial deviation from the plan originally outlined in the proposal. Attach preprints or reprints as appropriate.
3. An updated schedule for completing your degree program
4. A completed budget form
5. A recommendation letter from the academic advisor
6. Recent transcripts

The complete, assembled proposal packages should be submitted to:

Earth System Science Fellowship Program
NASA Peer Review Services, Code Y
500 E Street, SW, Suite 200
Washington, DC 20024-2760
Telephone: (202) 479-9030

Submission Deadlines

Deadline for receipt **NEW** applications:	4:30 p.m., EST March 15, 2002
Deadline for receipt of **RENEWAL** applications:	4:30 p.m., EDT, May 31, 2002

Announcement of Selections

The new applications that are selected for award will be announced (http://research.hq.nasa.gov) by **June 30** of each year, with an anticipated starting data of the fellowship award to be **September 1** of each year. After the selections are announced and posted at the aforementioned web address, a letter notification will be sent to the student's university address, unless requested in writing to be forwarded to an alternate address.

The renewal students will also be notified by June 30 of each year concerning the continuation of the fellowship awards.

Inquiries

Additional inquiries may be sent to Ms. Anne Crouch at acrouch@hq.nasa.gov or by calling (202) 358-0855.

Privacy Act Statement

General

Pursuant to Public Law 93-579, Privacy Act of 1974, as amended (5 U.S.C. 552a), the following information is being provided to persons who are asked to provide information to obtain a NASA Graduate Student Fellowship.

Authority

This information is collected under the authority of the National Aeronautics and Space Act. Publication 85-568, as amended, 42 U.S.C. 2451, et. seq.

Purpose and Uses

The information requested on the application form will be used to determine your eligibility for participation in the NASA Graduate Student Fellowship Program. The information requested regarding your disability status will be used to determine the degree to which members of each ethnic/racial/disability group are being reached by NASA's announcement of this program, and will not affect your application. Additionally, NASA may disclose this information to other organizations or individuals having relationships with NASA, including but not limited to academic organizations, non-profit organizations, and other governmental agencies, as well as Congressional offices in response to an inquiry made on your behalf. Disclosure may also be made to concerned parties in the course of litigation, to law enforcement agencies, and to other Federal agencies in exchanging information pertinent to an agency decision.

Effects of Nondisclosure

Furnishing the information on the application form is voluntary, but failure to do so may result in NASA's inability to determine eligibility for participation and selection for award in the Graduate Student Fellowship Program. However, your application will not be affected if you choose not to provide information on your ethnic, racial, or disability status.

Definitions for Applicant Background - Section VI

American Native or Alaskan American: A Person having origins in any of the original peoples of North America and who maintains cultural identification through tribal affiliation or community recognition.
Hispanic: A person of Mexican, Puerto Rican, Cuban, or South American or other Spanish culture or origin, regardless of race.
Asian: A person having origins in any of the original peoples of East Asia, Southeast Asia or the Indian subcontinent. This area includes, for example, China, India, Indonesian, Japan, Korea and Vietnam.
Pacific Islander: A person having origins in any of the original peoples of Hawaii; the U.S. Pacific territories of Guam, American Samoa, and the Northern Marinas; the U.S. Trust Territory of Palua; the islands of Micronesia and Melanesia; or the Philippines.
African American, nor of Hispanic origin: A person having origins in any of the black racial groups of Africa.
White, not of Hispanic Origin: A person having origins in any of the original peoples of Europe, North Africa, or the Middle East.
Individuals with Disabilities: An individual having a physical or mental impairment that substantially limits one or more major life activities; who has a record of such impairment; or who is regarded as having such impairment.

I. Student Information

Name: (Mr./Ms.)

Last First MI

Birth Date:

Permanent Address:

Home Phone:

Citizenship:

Expected Degree Completion Date:

Campus Address:

Department:

Mail Code:

University:

Street Address:

City, State, ZIP:

Campus Phone: Fax:

E-Mail:

Undergraduate GPA: Out Of

Field of Study:

Graduate GPA (If Applicable) Out Of

Field of Study:

II. Faculty Advisor Information

Name:

Campus Address:

Department:

Mail Code:

University:

Street Address:

City, State, ZIP

Campus Phone: Fax:

E-Mail:

Signature: Date:

III. Student Background (check each that applies)

___ Male
___ Female
___ White, not Hispanic
___ American Native or Alaskan American
___ Hispanic
___ Asian
___ Pacific Islander
___ African American
___ Individual with Disabilities

IV. Proposal Information

___ New ___ Renewal/Second Year ___ Renewal/Third Year

Applicable Area of Science Priority (check only one category)

Degree Program: ___ M.Sc. ___ Ph.D.

___ Biology and Biogeochemistry of Ecosystems and Global Carbon Cycle
___ Oceans and Ice in the Earth System
___ Global Water and Energy Cycle
___ Solid Earth Science
___ Atmospheric Chemistry, Aerosols, and Solar Radiation

Proposal Title (not to exceed 260 characters):

V. Certification of Compliance with Applicable Executive Orders and U.S. Code

By submitting the proposal identified in this application form in response to the Earth System Science Fellowship Announcement, the Authorizing Official of the proposing as identified below:

- Certifies that the statements made in this proposal are true and complete to the best of his/her knowledge;
- Agrees to accept the obligations to comply with NASA award terms and conditions if an award is made as a result of this proposal; and
- Confirm compliance with all provisions, rules, and stipulations set forth in the two Certifications contained in this Announcement [namely, (i) Certification of Compliance with the NASA Regulations Pursuant to Nondiscrimination in Federally Assisted Programs, and (ii) Certifications, Disclosures, and Assurances Regarding Lobbying and Debarment & Suspension].

Will provision of false information in this proposal and/or its supporting documents, or in reports required under an ensuing award, is a criminal offense (U.S. Code, Title 18, Section 1001).

Name of Authoring Institutional Officials:

Title of Authoring Institutional Officials:

Department:

University:

Street Address:

City, State, ZIP:

Campus Phone: E-Mail:

Signature: Date:

I certify that I am or will be a full-time graduate student enrolled at an accredited U.S. university during the period covered in the attached proposal.

Signature: Date:

Budget Form

Student Name: _____ Date of Birth: _____
Last First MI

Budget Information

Prorate Stipend and Allowances if Anticipated Tenure is Less Than 12 Months

Student Stipend (Maximum of $18,000)* $ 18,000

Student Allowance **(Itemize) ****

Travel to conferences and seminars, health insurance, books, etc.

Student Allowance $ 3,000
(Maximum of $3,000)

University Allowance **(Itemize) ****

Tuition & Fees expenses

University Allowance $ 3,000
(Maximum of $3,000)

Total Requested $ 24,000
(Maximum of $24,000)

*Clear justification must be made and approved by the Authorizing Institutional Official of the university if the amount of student stipend is greater than $18,000.

** Requested budget in these two categories may be exchanged, as long as the total sum for the two categories does not exceed $6,000